

The Shrinking Role of Demand and Supply Models in Gary Becker's Theories of Marriage¹

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ABSTRACT

This paper examines the evolution of Becker's theory of marriage from 1973 to 2000, its focus being a comparison between his first JPE article published in 1973 and the chapters on marriage in the Treatise on the Family published in 1981. Over this period, Becker gave more prominence to optimal sorting models of marriage at the expense of Demand & Supply models. Possible reasons for this evolution and some of its implications are discussed.

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I. Introduction

When the Nobel committee awarded its prize to Gary Becker in 1992, it singled out his economic theories of the family as a major contribution. Economic models of marriage occupy a central place in Becker's theory of the family. They therefore deserve close scrutiny. This paper examines the evolution of Becker's theory of marriage (BTM) from 1973, when his pioneering article was published in the *Journal of Political Economy (JPE)*, to 1981, the year Becker published his book *Treatise on the Family*.²

Even though his students Reuben Gronau (1970) and Fredericka Pickford-Santos (1970) worked in this area and a brief note was published by Martin Bronfenbrenner in 1971 before the appearance of Becker's first article, Becker is considered the pioneer in economics of marriage. From the onset, Becker (1973) presented two theoretical models of marriage: a Demand and Supply (D&S) model assuming homogeneous participants competing with each other, and an optimal sorting model assuming a rank ordering of heterogeneous participants.

Within the period 1973-1981 Becker made substantial changes to the presentation of his theory of marriage. Section II discusses Becker's models of marriage as published in the *JPE* articles and the *Treatise*, with an emphasis on D&S models. Section III presents other models of marriage that Becker authored and shows that over time Becker shifted from D&S models to optimal sorting models. Section IV offers possible reasons for this shift.

II. Becker's D&S and Optimal Sorting Models of Marriage: 1973 to 1981

Becker's theory of marriage (BTM) first appeared in two articles entitled 'A Theory of Marriage', originally published in the *Journal of Political Economy (JPE)* in 1973-74, and then in a book, the *Treatise on the Family*, originally published in 1981. In Becker's *Treatise* marriage market models appear principally in chapters 3 (Polygamy and Monogamy in Marriage Markets) and 4 (Assortative Mating in Marriage Markets).³ The sections on marriage were reproduced without any changes in the second edition of the *Treatise*, published in 1992. Becker's *Treatise* is by far the most influential item ever published in the field of theoretical models of marriage. By September 2006, according to Google Scholar, the *Treatise* in its various editions (including a Spanish edition) was cited more than 3000 times and was Becker's most cited item.⁴

Both the 1973 (*JPE*) and the 1981 (*Treatise*) versions of BTM contain two types of marriage models: D&S models and optimal sorting models, but the two versions differ in the relative weight they placed on the two types of models. D&S models assume that homogeneous participants on the same side of a market compete with each other. Optimal sorting models assume heterogeneity and matching of participants who have been ranked according to a certain criterion.

² A second edition of the *Treatise* was published in 1992, but it is not very different from the first edition.

³ The *Treatise* also offers an analysis of altruism in the family (chapter 8), of analogies between mating among humans and among other species (chapter 9), of divorce (chapter 10), and some explanations for changes in family characteristics in a number of industrialized countries in the period between 1950 and 1978 (chapter 11). It is in chapter 11 that Becker attributes the following trends to the growth of U.S. women's earning power: lower fertility, growth in lone motherhood, higher divorce rates, higher labor force participation of married women, and higher school enrollment rates for women. This conclusion has been criticized e.g. by Barbara Bergmann (1995) and Frances Woolley (1996).

⁴ Using all versions, Becker's book *Human Capital* is cited about as frequently.

Economic models are meant to resolve all or part of the three basic economic problems: allocation of factors of production, production, and distribution. Both types of model--D&S models and optimal sorting models--have in common that they (1) deal with production; (2) deal with the allocation of resources, the problem of allocation of resources being the dual of the problem of production; (3) consider individuals as rational optimizers; and (4) recognize the role of markets.

To the extent that they deal with production, all BTM models involve an analogy between marriages and firms. In that sense, BTM is a product of the New Home Economics pioneered by Becker and Jacob Mincer while both were at Columbia (see Grossbard-Shechtman 2001a).

All BTM's models address the basic economic problem of *allocation*: the allocation (or sorting) of men and women into matches. Both D&S models and optimal sorting models of marriage recognize that markets play a role in facilitating this sorting into matches. Optimal sorting models are more general than D&S models in the sense that they focus on the *sorting result*, namely the very best allocation of men and women into matches, and consider various possible *sorting processes*. Some sorting models are closer to D&S models than others. Matching models in the tradition of David Gale and Lloyd Shapley's (1962) 'stable marriage problem' are further from D&S models than Tjalling Koopmans and Martin Beckmann's (1957) which they called 'assignment problems'.⁵ D&S models of marriage only consider sorting processes that utilize a price mechanism.⁶

A central difference between optimal sorting models and D&S models lies in the degree to which they help resolve the third basic economic problem of *distribution*. It is difficult to analyze distribution problems with optimal sorting models. Optimal sorting models have mostly been used to explain allocation and economists tend to turn to other types of models, such as bargaining models, to resolve distribution problems.

A major advantage of D&S models based on the operation of a price mechanism and competition lies in these models' capacity to simultaneously and parsimoniously resolve problems of allocation, production, and distribution. A disadvantage of D&S models is their lack of generality: the models need stronger assumptions than most alternative models of optimal sorting and bargaining, including the assumption that a price mechanism operates and that there is competition. In turn, the existence of competition depends on degree of homogeneity, ease of entry and exit, and the number of participants.

D&S Models of Marriage in BTM

There is much in common between the theory of marriage that Becker published in the *JPE* in 1973 and 1974 and in the *Treatise* in 1981. Both versions of BTM (the *JPE* articles and the two main chapters on marriage in the *Treatise*) contain graphic presentations of D&S models of marriage that are in line with the Marshallian tradition of preference for the price mechanism over the command mechanism of organization.

⁵ I owe this point to Valerio Filoso.

⁶ Some have shown that, with large numbers of participants, the core of the economy converges to the set of competitive equilibria as the numbers of agents in the economy tends to infinity. The core is the set of all allocations that can't be "blocked" by some coalition. This general theorem suggests a potential connection between equilibrium models and sorting models, like those considered in Becker's original Theory of Marriage. See Werner Hildenbrand 1982. I owe this point to William A. Brock.

Prices in Becker's D&S models of marriage are mostly implicit prices, although he recognizes that some societies also have explicit prices for brides or grooms. Becker briefly recognizes how these prices can affect intra-marriage distribution of income. He typically phrases his discussions of implicit prices in terms of shares of the gain from marriage received by men or women, or as the equilibrium income [from marriage] that men and women obtain. The application of D&S analysis in BTM is analogous to that of other applications of such analysis extensively studied by economists for decades. So even though Becker does not expand on the role of prices/shares of gains of marriage on the distribution of income, it follows that these prices help determine the allocation of resources inside the unit of production--in this case a married household—and the relative well-being of husband and wife.

The same basic competitive D&S model of marriage appears both in the *JPE* article and the *Treatise* (see Figure 1 in Becker 1973 and Figure 3.1 in Becker 1981). It assumes that identical men and identical women are in the market for one another. As a couple, a man and a woman can produce a composite good Z_{mf} (with homogeneity of men and women this gain was assumed to be the same for all couples) that exceeds the sum of the Z_f a woman could produce alone and the Z_m that a man could produce alone. The market then determines how the total gain from marriage $Z_{mf} - Z_m - Z_f$ is subdivided between husband and wife. Graphically, this is presented as a market for wives, with the supply being a horizontal line equal to Z_f for every woman in the market. The supply becomes vertical and rises when the market runs out of women. The demand by men is established as a horizontal line equal to $Z_{mf} - Z_m$, the maximum that men are willing to pay women to marry them (i.e. women get the entire gain from marriage). The demand becomes vertical and falls when the market runs out of men. It follows from this market analysis that if the number of men exceeds the number of women, i.e. the sex ratio exceeds one, the entire gain from marriage goes to women. If the number of women exceeds the number of men, the entire gain from marriage goes to men. If the number of men and women are the same, the market does not determine the division of the gains from marriage. Bargaining leads to the establishment of a lower limit for women's market compensation at Z_f (with the entire gain going to men), and an upper limit at $Z_{mf} - Z_m$ (with the entire gain going to women).

As has been recognized by Becker, this particular D&S model does not determine how gains from marriage would be distributed between husbands and wives. However, other D&S models of marriage such as the other D&S model in Becker (1973) discussed below, lead to a well-determined distribution. The indeterminacy that follows from some of the D&S models has opened a door to two-person models of marriage focused on explaining intra-household distribution problems.⁷ Since the 1980s, such problems have been of great interest to economists, including many development economists (see, for instance, Angus Deaton, Javier Ruiz-Castillo and Duncan Thomas 1989; John Hoddinott and Lawrence Haddad 1995). Two-person models of marriage have become the most popular theoretical models in economics of marriage.⁸ They include bargaining theories of marriage such as Marilyn Manser and Murray Brown (1980) and Marjorie McElroy and Mary Jane Horney (1981), other game-theoretical models of marriage such as Shelly Lundberg and Robert Pollak (1993), and models such as Patricia Apps and Ray Rees

⁷ Oral communication during the period 1974-1976.

⁸ Based on the author's compilation from Google Scholar citations in 2006 (available upon request).

(1988) and Francois Bourguignon and Pierre-Andre Chiappori (1992) that don't specify how a Pareto optimum is reached in a marriage.

Both versions of BTM also contain a major implication of D&S analysis, namely that sex ratios affect both quantity (allocation into marriage) and distribution of the gains of marriage between husband and wife.

Differences in the Coverage of D&S Models

There are also fundamental differences in the prominence of D&S models in the two versions of the theory. The two versions of BTM differ

1/ in their use of explicit language steeped in price theory. The language of price theory is used more frequently in the 1973 article than in the 1981 *Treatise*. In the *JPE* article of 1973 the role of prices in the model is clearly stated, as in the following passages: "Each marriage can be considered a two-person firm with either member being the 'entrepreneur' who 'hires' the other at the salary m_{ij} or f_{ij} and receives residual 'profits' (...). Another interpretation of the optimal sorting is that only it enables each 'entrepreneur' to maximize 'profits' for given 'salaries' of mates... With all other sortings, some 'entrepreneurs' could do better by 'hiring' different mates than those assigned to them..." and "...the 'shadow' price of an hour of t_f [female household production time] to a single M [male]—the price he would be willing to pay for t_f —would exceed w_f [the female wage], and the 'shadow' price of an hour of t_m [male household production time] to a single F [female]—the price she would be willing to pay for t_m —would exceed w_m [the male wage]. Both gain from marriage because M then, in effect, can buy an hour of t_f at w_f and F can buy an hour of t_m at w_m , lower prices they then would be willing to pay. Of course this is also why married households use positive amounts of t_f and t_m ."

In other words, Becker writes that a woman's implicit wage in marital production may exceed the opportunity cost of her time as measured by her wage in the labor force. These statements that appear directly imported from labor economics are clear about the role of price in a demand for labor. This is about demand as the willingness to pay for an hour of a spouse's household production time. Even though the *Treatise* reproduces many other paragraphs from the same section of the *JPE* article in which the D&S jargon appeared (including numerical examples of optimal sorting), this jargon does not appear in the *Treatise*'s chapters on marriage markets.

2/ in their graphs of D&S of mates. In addition to the basic D&S model of marriage common to both venues, the two publications contain different graphical D&S models of marriage markets. The 1973 article presents a market for men of type i and women of type j which assumes that people can substitute between different types of spouses (Figure 2), whereas the 1981 *Treatise* contains more markets with polygyny (Figures 3.2 and 3.3). Possible reasons for Becker's omission of the second marriage market model in the *Treatise* are discussed in the next section.

The second graphic D&S model presented in Becker's 1973 *JPE* article models choice between mates of different types, in contrast to the first model that assumed homogeneous men and homogeneous women. This model is therefore most relevant to complex societies like ours. In this model, supply and demand takes account of possible substitution between mates belonging to a continuum of different types. Becker shows that in these circumstances the equilibrium division of output in marriage can fall

anywhere between the best division from a male point of view and the best division from a female point of view (Figure 2).

3/ in their *order of presentation and subsection titles*. In the 1973 *JPE* article graphical D&S models are presented regardless of cultural context. In contrast, in the *Treatise*, such models appear only in the chapter on polygamy. The different placement of D&S analysis is likely to reduce awareness among *Treatise* readers that such analysis solves distribution problems. It is in a section entitled ‘division of output between mates’ that the first *JPE* article presents analyses of D&S in marriage markets.⁹ The reader who studies this article finds it difficult to escape the conclusion that D&S models of marriage markets influence the way that marital output is divided between husbands and wives in any society, regardless of whether it is polygamous or monogamous. In contrast, the *Treatise* does not include a section entitled ‘The division of output between mates’ containing a D&S graph explicitly applied to the distribution problem.

Statements found in the *Treatise*, such as “The bumping of lower-quality men out of their marriages through competitive reductions in the incomes of higher-quality men continues until the incomes of the lowest-quality men are reduced to their single levels”, indicate that supply and demand of brides and grooms influences distribution of marital output, but the connection is not as obvious as it would be to a reader of the 1973 *JPE* article.

4/ in their *use of optimal sorting models*. Parallel to the reduced emphasis on D&S models, one finds the 1981 version of BTM giving more prominence to optimal sorting models. In the *Treatise*, Becker expands optimal sorting models and develops what he calls an equilibrium sorting model. This analysis, found in a section on sorting (in the chapter on assortative mating), also addresses the problem of distribution, as evident from this statement: “This analysis shows that the equilibrium income and mate assigned to any person by the optimal sorting depends not only on his traits but also on the traits of everyone else in the marriage market.” (Becker 1981, p. 80). However, while D&S models of marriage contain a graphical exposition, are reminiscent of other widely used D&S models, and are easy for economists to follow, the expanded optimal sorting model in Becker (1981) uses mathematical concepts that are not as popular among economists.

III. Other Models of Marriage by Becker

Search models dominate the economic analysis of divorce that Becker co-authored with Robert T. Michael and Elizabeth Landes and that appeared in 1977. Becker et al. test a number of predictions derived from BTM and search theory, such as the prediction that individuals with rare characteristics may be less attractive relative to people with more generally desired characteristics.¹⁰ To the extent that a price mechanism lies at the basis of search models of marriage, search models complement

⁹ Other subsections in this article are entitled: ‘the gain from marriage’, and ‘the marriage market and sorting of mates’. The second *JPE* article (1974) includes a section entitled ‘love, caring, and marriage,’ a short section on polygamy (2 ½ pages, in contrast to an entire chapter in the *Treatise*), a section on assortative mating and natural selection, and a section on life-cycle marital patterns that includes an economic analysis of search in marriage markets.

¹⁰ Other predictions derived and tested in Becker, Landes and Michael (1977) follow from search theory: information is imperfect prior to marriage and divorces are most likely to occur in the first year of marriage (rather than in any later year) due to the fast accumulation of new information about the spouse right after the marriage. Moreover, Becker, Landes and Michael predict and confirm that shotgun marriages, i.e. marriages that occur after the bride gets pregnant, are more likely to end in divorce.

D&S models. Another group of predictions in the same article analyzes the determinants of divorce as a function of the total gain from marriage that a couple produces. In a market equilibrium the gain from marriage of people who are considered less attractive as marriage partners is expected to be lower and therefore they may be more likely to divorce.

The same article also develops the idea that individuals invest in human capital related to productivity in marriage. The concept of marriage-specific investments is presented, by which the authors mean ‘an investment that raises the output produced in a particular marriage,’ thus bridging between Becker’s economics of marriage and his theoretical work on human capital (see Becker 1964).¹¹ Earlier work by economists considered part of the New Home Economics had also analyzed wives’ investments in their husband’s human capital, and vice-versa (Lee Benham 1974 and Michael Grossman 1976).

Becker’s only recent academic publication on marriage is a chapter with Kevin Murphy in *Social Economics* (2000) that includes a sorting model of marriage and no D&S model.

Based on four data points, the trend is even clearer than based on the 1973 and 1981 publications: in his writings on marriage in the early to mid-1970s (Becker 1973 and Becker, Landes and Michael 1977) Becker relied more on D&S models than in his later writings (Becker 1981, Becker and Murphy 2000). What explains Becker’s shift away from D&S models of marriage?

IV. Possible Reasons for Becker’s Shift Away From D&S Models of Marriage

Can we infer from the smaller space accorded D&S models in the *Treatise* and the absence of such models in Becker and Murphy (2000) that Becker changed his mind about the usefulness of D&S models of marriage? One of the advantages of studying the thoughts of a living economist is that one can ask. In a 2004 email I asked Becker why one of the two D&S graphic models of marriage found in the 1973 *JPE* article was not reproduced in the *Treatise*. In his emailed response, Becker explained the disappearance of the D&S model with heterogeneous men and women from the 1981 version of BTM as follows: “My *Treatise* was considered by me to be a complement to my previous work, not a substitute. So I did not go over everything in the earlier papers that I considered to be valid and sometimes even important.” (Becker, 2004) In that same exchange, Becker stated that he had not changed his mind about the validity and applicability of D&S models to the study of marriage: “I never abandoned my view that imputations to men and women are determined by a competitive marriage market - what you call the supply demand framework.”

That Becker continued to support his own D&S models after he had completed the *Treatise* is apparent from an exchange he had with Marjorie McElroy, one of the first economists to publish a two-person theory of marriage. Two-person models are an alternative to both D&S and optimal sorting models of marriage. While a post-doc at Chicago in the period 1979-1981, McElroy presented her not-yet-published bargaining analysis of marriage (co-authored with her student Mary Jean Horney) in Becker’s workshop in applications of economics. Becker recalls that during the seminar he “jumped on her for not including market forces.” (Becker 2004) According to McElroy,

¹¹ Becker also played a pioneering role in the development of the economic analysis of human capital, other influential pioneers being Jacob Mincer and T.W. Schultz.

her “experience at Chicago changed [her] whole career...Two of [her] later papers on Nash-bargained behavior were very much influenced by [her] experience at Chicago...the term EEP (Extramarital Environmental Parameter) coined in [McElroy 1990] was in obvious homage to Becker.” (McElroy 2006).

A second possible reason for Becker’s revealed shift away from D&S models takes into account his motivation to attract the interest of sociologists. In part, Becker called his book a *Treatise* for he wanted to avoid a title containing the word ‘economic’.¹² He did not call it a “treatise” to imply that it replaces earlier articles, including the JPE article emphasizing D&S models of marriage.¹³ In the late 1970s, when Becker was working on the *Treatise* and his work was being published exclusively in economics venues, sociologists had not yet taken an interest in Becker’s ideas about the family. When the *Treatise* was being prepared there was some antagonism to Becker’s entry into a subject matter traditionally in the domain of sociologists (see, for instance, Remi Clignet and Joyce Sween 1977). At that time, even his sociology colleagues at Chicago who researched the family ignored Becker’s theories on the topic (see Grossbard-Shechtman 1981). Given that the family has traditionally been a topic studied by sociologists, Becker wanted the *Treatise* to make his theory of marriage more appealing to sociologists. It is this desire to appeal to non-economists that led Becker to choose the title ‘*Treatise*’. This motivation to reach out to sociologists may also have led Becker to avoid statements, assumptions, and jargon likely to alienate readers reluctant to apply traditional D&S analysis to marriage problems.¹⁴ However, while the *Treatise* dropped some D&S jargon and math, it added new optimal sorting models that most readers would find mathematically challenging. Therefore, eagerness to please sociologists is not a good explanation for Becker’s shift away from D&S models.

A third possible explanation for Becker’s shift away from D&S models recognizes that professors are to some degree influenced by their intellectual surroundings. Becker’s intellectual landscape changed during the period that he worked on the economics of marriage. When he first started writing his theory of marriage he was at Columbia, where his students Reuben Gronau and Fredericka Pickford-Santos worked on this topic and where he ran the labor workshop with Mincer, a workshop heavily leaning towards D&S analysis.

Becker moved from Columbia to Chicago in 1969, and it is in the early 1970s at Chicago that he put the finishing touches on the theory of marriage published in the *JPE* in 1973 and 1974. At that time, the presence of the New Home Economics was clearly felt at Chicago. Gregg Lewis, who had been one of Becker’s teachers at Chicago in the 1950s, was teaching an entire semester of New Home Economics. In 1973 Becker and Gregg Lewis authored a paper on the trade-off between child quality and number of

¹² Based on conversations with Becker in the years 1974-1976.

¹³ This had been the perception of Sarah Hamersma, who recently completed her Ph.D.

¹⁴ Becker’s efforts at reaching out to sociologists of marriage were hugely successful: Becker has achieved undeniable prominence among quantitative sociologists and demographers studying marriage. That the study of marriage is primarily a field dominated by sociologists helps explain Becker’s enormous prominence in quantitative research on marriage, whether generated by sociologists or economists. Few articles on marriage by sociologists or demographers are currently published without a reference to Becker. One of the reasons that Becker is among the most cited economists in the world is that his citations also come from social scientists outside economics (not only those who write on marriage), and sociologists tend to cite more than economists (see Grossbard-Shechtman 2001b).

children, a model that also rests on traditional price theory. Gilbert Ghez, a former student of Becker and Mincer at Columbia who had specialized in New Home Economics and co-authored a paper with Becker on a NHE topic, was an assistant professor. Mincer visited Chicago in 1974. By 1975, Ghez had left, Gregg Lewis had gone to Duke, and Mincer had rejected an offer for a tenured position at Chicago and returned to Columbia.

BTM's evolution in the 1970s reveals parallels with that of the department of economics at Chicago in the 1970's. Becker's hiring and firing preferences were and remain influential at Chicago, so it could be that to some degree the evolution of the department followed that of Becker. However, that evolution is also likely to be a function of many other factors, including a general shift towards game theory and mathematical economics in the economics profession in the 1970s.¹⁵

The department that Becker joined in 1969, coming from Columbia, was more committed to Marshallian D&S models than it was ten years later, when Becker was putting finishing touches on the *Treatise*.¹⁶ In the early 1970s, the department's intellectual culture was heavily influenced by Milton Friedman and George Stigler. With Marvin Reder, they had been identified as part of the "Chicago School" in an influential article by Laurence Miller (1962). "To Miller, this school was marked by the belief in neo-classic economics and an identification of ideal and actual markets." (Bruce Kogut and J. Muir Macpherson 2003). Friedman and Stigler were powerful advocates for D&S models, following in the footsteps of the earlier Chicago School of Frank Knight and Jacob Viner (see Milton and Rose Friedman 1998). His enthusiasm for the topic led him to regularly teach the first sequence in micro-economics (called theory of price) in which he emphasized the advantages of the relatively simple D&S models and generally advocated simplicity in modeling. By 1973, Friedman had stopped teaching that course and he soon after moved from Chicago to the Hoover Institute in the Bay Area. It is possible that Friedman's departure was a factor that contributed to Becker's shift away from D&S models, even though Becker has continued to interact regularly with Friedman at Hoover. However, Friedman's strong pitch for D&S models was probably more influential as long as he regularly participated in Chicago workshops and taught the first segment of the price theory sequence that fed into Becker's second-quarter course.

While the influence of practitioners of D&S models was waning, that of optimal sorting practitioners increased. William A. Brock is one of the mathematical economists who joined Chicago during this period. Becker (1973, 1974) acknowledges Brock's contribution to the mathematical appendix to his optimal sorting models. Few of the new faculty members joining Chicago in the 1970s were invested in D&S models, an exception being Sherwin Rosen. However, Rosen also authored game-theoretical models, including one with Edward Lazear who also arrived to Chicago in the 1970s and authored more game theoretical models on his own. Under the influence of James Heckman and Lazear, the labor economics program at Chicago became increasingly oriented towards labor and econometrics, replacing the earlier emphasis on D&S models.

These developments in the economics department at Chicago in the 1970s—developments that are related to the rise of formalism in economics during this period--help understand the shift away from D&S models in Becker's theory of marriage.

¹⁵ One anonymous referee suggested that the evolution of Becker's theory of marriage was a function of the rise of formalism in economics.

¹⁶ See also Grossbard-Shechtman (2001a).

Nevertheless, Becker continued to stand behind his D&S models and in the mid 1970s wrote the following endorsement for market analysis in his introduction to the *Economics of Human Behavior* (Becker 1976), a book that contains his 1973 *JPE* articles on marriage: “The combined assumptions of maximizing behavior, market equilibrium, and stable preferences, used relentlessly and unflinchingly, form the heart of the economic approach as I see it.” That Becker later became less relentless and unflinching about these modeling assumptions is also evident from his broader use of the assumption of stable preferences after 1980 (see Becker and Murphy 1986). Furthermore, Becker was far from relentless in pointing out that his own D&S models of marriage based on individual utility functions and market analysis were an effective answer to the mounting criticisms of what is now known as his ‘unitary’ models of household decision-making. Prior to his theory of marriage Becker’s work in the tradition of the New Home Economics assumed a single household utility function and a single household production function, which led to the prediction that individual access to consumption does not depend on who earns what in a household.¹⁷ This so-called unitary assumption has been extensively criticized by many of the authors and users of two-person theories of marriage. These models imply that household consumption varies with the intra-marriage distribution of income. In other words, what married individuals (and their children) consume depends on their individual incomes.

These critics typically fail to acknowledge Becker’s D&S models of marriage that also assume that husband and wife have separate utility functions and imply that the intra-marriage distribution of income matters when explaining household consumption. In private, Becker has recognized that those who criticize his assumption of a unitary household making consumption and time allocation decisions don’t acknowledge how his D&S models of marriage deal with distribution problems in marriage (Becker 1993). However, Becker has never made this point in writing.

V. Conclusions

This paper has documented major changes that Becker made to his theory of marriage during the 1970s. Whereas D&S models were the dominant models in the *JPE* versions of the theory published in 1973, optimal sorting models were getting more visibility in the 1981 version of his theory of marriage that appeared in the *Treatise on the Family*. Unless they were particularly interested in polygamy, readers of the *Treatise* may very well have skipped the chapter on polygamy containing a D&S model, and concentrated instead on the other chapter about marriage, the chapter on assortative mating based on an optimal sorting model.

A number of possible explanations for this shift were examined. The most plausible one views Becker’s changes as part of the trend towards more game theory and mathematical economics in the economics profession in general. This trend could simultaneously explain both the increased popularity of two-person marriage models based on game theory and Becker’s switch to optimal sorting theories.

It is also possible that the increased interest in two-person theories of marriage is to some degree a consequence of Becker’s change in emphasis. Economists interested in analyzing the intra-household distribution of consumption goods may not have found much help in Becker’s optimal sorting models that are more adaptable to the analysis of allocation of mates than to the analysis of intra-household allocation of consumption or

¹⁷ e.g. Becker (1965). The same holds for the work of Mincer (e.g. Mincer 1963).

leisure. They could have learned more from the D&S model that assumes heterogeneity published in Becker (1973), but from reading the *Treatise* and Becker and Murphy's (2000) chapter on marriage it is difficult to realize the value of BTM for analyzing distribution problems in marriage. Becker's silence in response to the many critiques of his unitary model is also likely to have discouraged young economists from using his D&S models when addressing issues of intra-household distribution.

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